



Department of
**Environment &
Conservation**

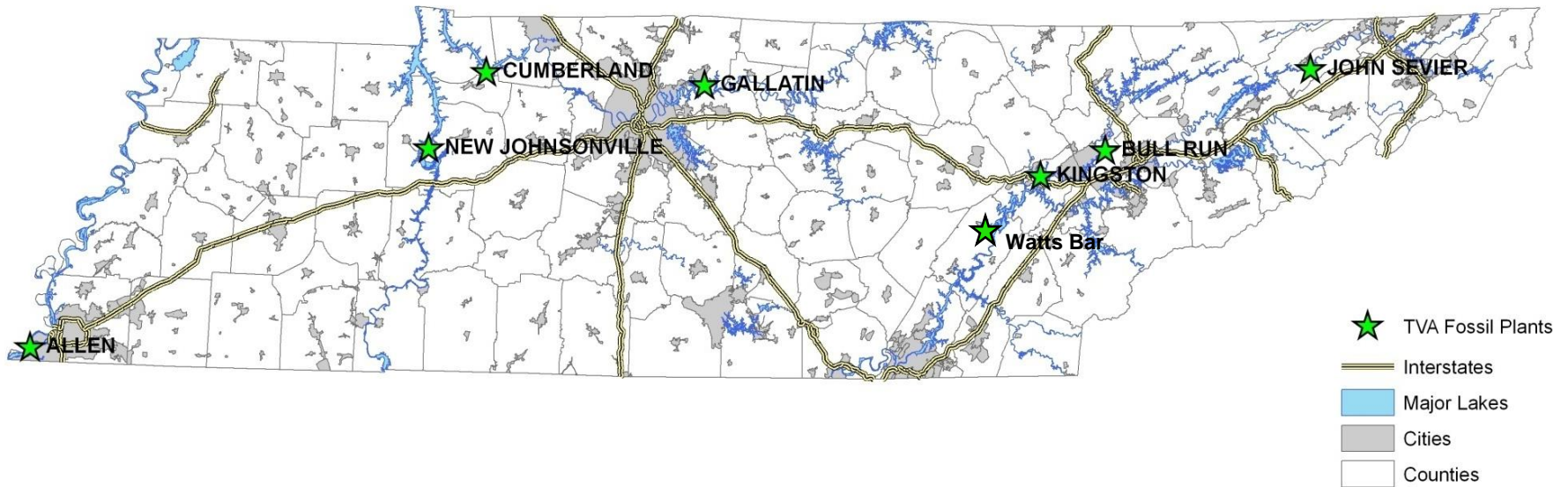
Investigating CCR Impacts: An Overview of the EIP Process in Tennessee

Environmental Show of the South 2018

Introduction

- Tennessee's Regulated CCR Units and Location
- Commissioner's Order OGC15-0177
- Environmental Investigation Plan (EIP)
- Commissioner's Order Site Updates
- Questions and Comments

Tennessee TVA CCR Facilities



OGC15-0177 (Commissioner's Order) August 6, 2015

Order Has Two Purposes

1. Establish transparent and comprehensive process for the investigation, assessment, and remediation of unacceptable risks, resulting from the management and disposal of coal combustion residuals (CCR) at TVA's coal-fired power plants in Tennessee.
2. Coordination of implementation of the Federal CCR Rule to insure compliance with Tennessee laws and regulations that govern the management and disposal of CCR.

Brief History of the Order

- August 2015 – Final Order Issued
 - Applicable to 7 of 8 TVA CCR Sites in TN (Gallatin excluded)
- 2016
 - Site investigation conferences
 - TDEC issues Environmental Investigation Plan (EIP) request letters
 - Revision 0 EIP's submitted by TVA
- 2017
 - Continued review and revision of EIPs for each facility
- 2018
 - Final EIP revisions are being completed
 - All Interested Parties (AIP) and Public Comment on EIPs
 - EIP implementation begins fall 2018

Commissioner's Order Timeline

- 2020-2021
 - Projected completion of environmental investigation
 - Development and submission of Environmental Assessment Report (EAR)
 - Development and submission of Corrective Action/Risk Assessment (CARA) Plans
 - AIP and Public Comments on CARA Plans
- 2021-2022
 - Final approval and implementation of corrective action

Environmental Investigation Plan (EIP)

- The Order requires TVA to develop an EIP for each site that, when implemented, shall provide the data necessary to *"fully identify the extent of soil, surface water, and ground water contamination by CCR"*
- EIP development is an iterative process requiring review and input from TDEC
- TVA will address any comments, submitting additional revisions, and repeating the process until TDEC approves the EIP and schedule
- TDEC approved EIP will be presented at the AIP and issued for public comment
- EIP will be deemed complete when all public comments have been adequately addressed by TVA

Objectives of the EIP

- Define background conditions:
 - soil
 - surface water, sediment, and aquatic life
 - groundwater
 - pre-construction site conditions (topography, hydrology)
- Determine how each unit was constructed and modified during lifetime
- Develop a thorough understanding of the geology at the site
- Define groundwater flow and chemistry at the site
- Delineate potential impacts to groundwater, soil, surface water, sediment, and aquatic life

Objectives of the EIP

- Characterize CCR material
 - quantity
 - chemistry
 - physical characteristics (geotechnical)
 - saturation levels
 - existing and modeled for potential closure scenarios
- Data generated will be used to develop a final Environmental Assessment Report (EAR) and ultimately, an appropriate selection of remedy for each site

EIP Structure

- State clear objectives and goals for the investigation
- Develop site specific data and deliverables for the investigation
- Incorporate existing and ongoing data collection efforts where applicable
 - Federal CCR Rule compliance
 - state permit required monitoring
 - historical assessments and data that meet QA/QC standards of EIP
- Develop site specific Quality Assurance Project Plan (QAPP) and programmatic Data Management Plan (DMP)
- Develop site specific Sampling and Analysis Plans (SAPs) and schedule for investigation activities

Quality Assurance Project Plan (QAPP)

- A site specific QAPP will be developed to ensure that the investigation objectives are met by TVA and its contractors through the generation of documented, high-quality, and reliable investigative/analytical data
- Establishes an overall environmental QA framework for the investigation and provides quantitative objectives for analytical data generated under the investigation

Data Management Plan (DMP)

- Programmatic plan for the Order
- Addresses the logistical and technical challenges of managing data generated during the investigation
- Identifies the data management team, processes, and system used for the collection, management, and distribution of data collected

Sampling and Analysis Plans (SAPs)

- TVA has worked with TDEC to develop and execute SAPs to develop new data where needed
- The SAPs provide detailed plans for conducting those studies to obtain new data and describe how it will be used to respond to specific information requests
- The SAPs are structured as independent documents that guide the work of the field teams
- Included as appendices to the EIP

SAPs

- Example SAPs:
 - Material Quantity SAP
 - Material Characteristic SAP
 - Background Soil SAP
 - Hydrogeological Characterization SAP
 - Groundwater Characterization SAP
 - Exploratory Drilling SAP
 - Water Use SAP
 - Benthic SAP
 - Seep SAP
 - Surface Stream SAP
 - Fish Tissue SAP

CCR Parameters

40 CFR Part 257 Appendix III Constituents

Boron

Calcium

Chloride

Fluoride

pH

Sulfate

Total Dissolved Solids

CCR Parameters

40 CFR Part 257 Appendix IV Constituents

Antimony	Fluoride
Arsenic	Lead
Barium	Lithium
Beryllium	Mercury
Boron	Molybdenum
Cadmium	Selenium
Chromium	Thallium
Cobalt	Radium 226 and 228 Combined

CCR Parameters

TN Rule 0400-11-01-.04, Appendix 1 Inorganic Constituents

Copper

Nickel

Silver

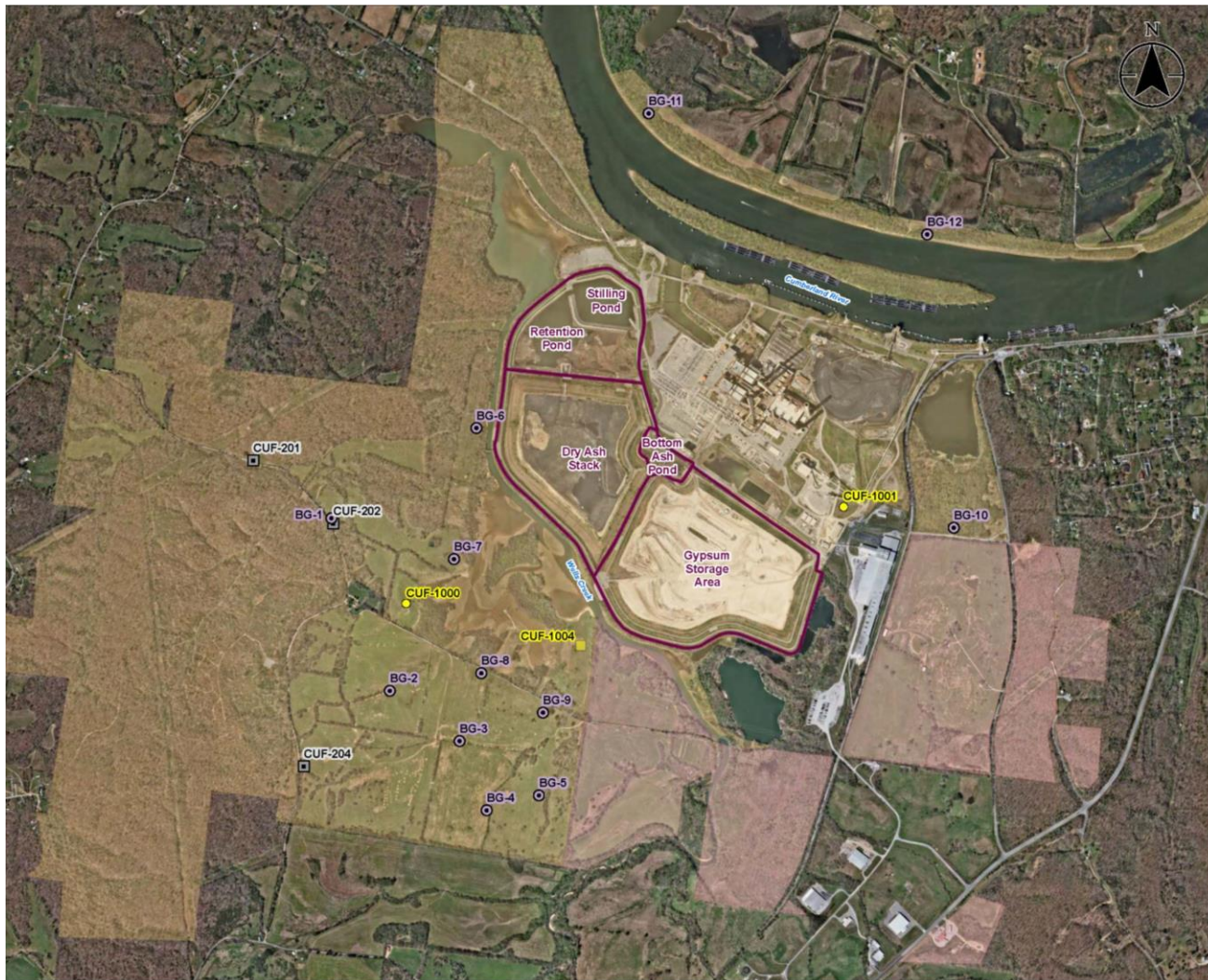
Vanadium

Zinc

Background Soil SAP

- The objective of the Background Soil SAP is to characterize in place, native, background soils unaffected by CCR material
- Samples of surficial soil will be collected and analyzed for percent ash to determine the presence or absence of CCR (windblown or atmospheric deposition)
- Samples will be analyzed for CCR parameters

Background Soil SAP



Exploratory Drilling SAP

- Exploratory Drilling SAP objective is to outline the methods that will be used to:
 - perform additional soil and rock borings, piezometer installation, and laboratory testing to refine subsurface characterization and material quantity estimates
 - install temporary wells to allow for pore water sampling and measuring piezometric (i.e., water) levels within CCR units

Exploratory Drilling SAP



Exploratory Drilling SAP



Material Quantity SAP

- Objectives of the Material Quantity SAP are:
 - describe the methods TVA will use to determine CCR unit geometry
 - determine CCR material quantity
 - determine groundwater elevations, saturation levels, and subsurface conditions

Material Quantity SAP

- Activities will be completed to:
 - Estimate the volume of CCR below and above groundwater
 - Estimate the volume of CCR below and above the piezometric level of saturation
 - Develop three-dimensional models of the subsurface from ground surface to bedrock and CCR volume estimates for each CCR unit
 - Produce drawings specified in TDEC's information requests from the three-dimensional model
- Data will be collected through the Exploratory Drilling SAP

Material Quantity SAP



CCR Material Characteristics SAP

- Objective is to characterize the leachability of CCR and potential for future migration
- Procedures to collect and analyze pore water and CCR material and to characterize them for the CCR Parameters list (totals and leachable concentrations)

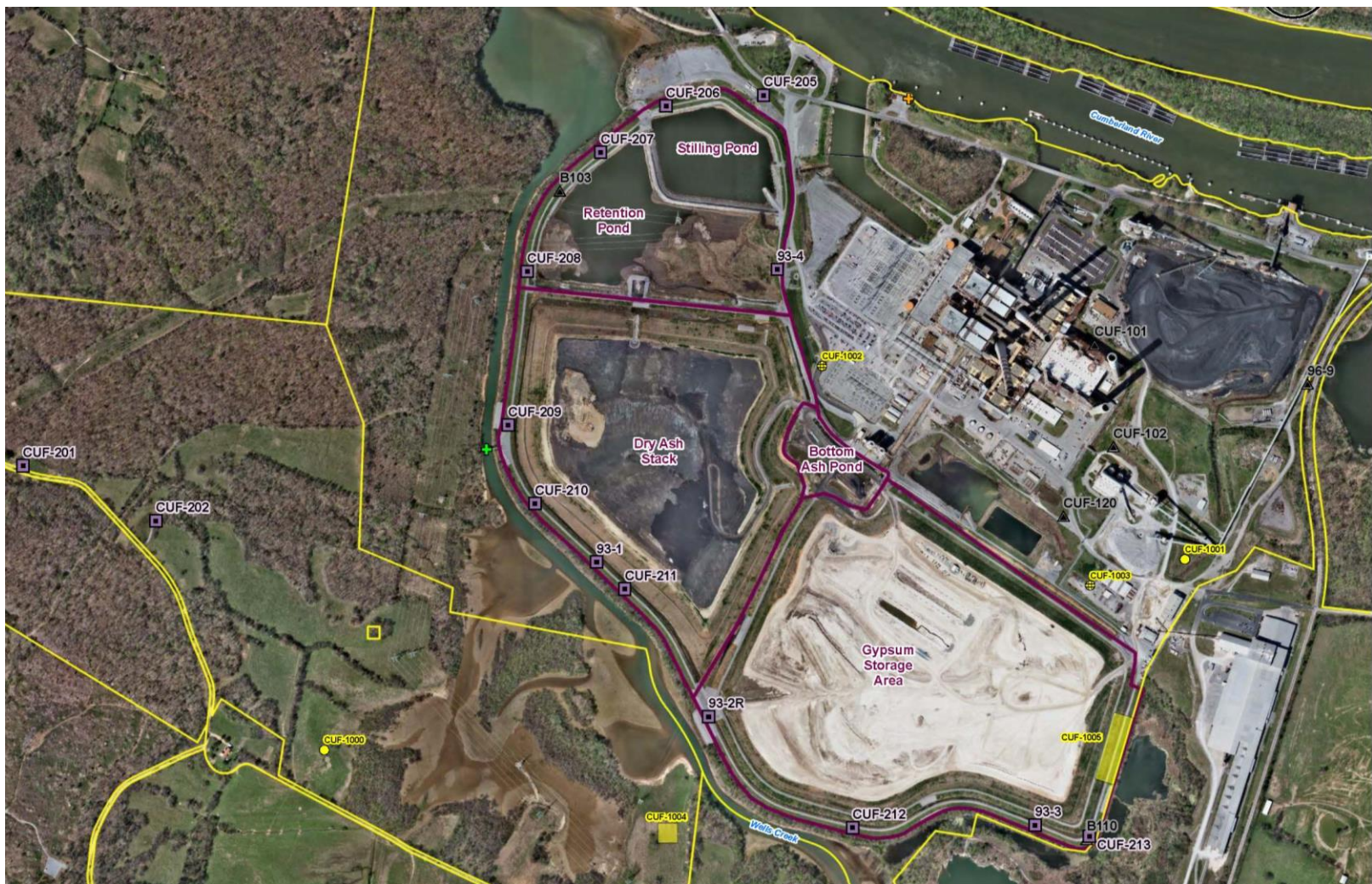
CCR Material Characteristics SAP



Hydrogeological Investigation SAP

- Objectives of the Hydrogeological Investigation SAP is to:
 - further characterize the groundwater flow direction at the facility
 - install monitoring wells to provide locations to collect groundwater samples for analysis of CCR parameters

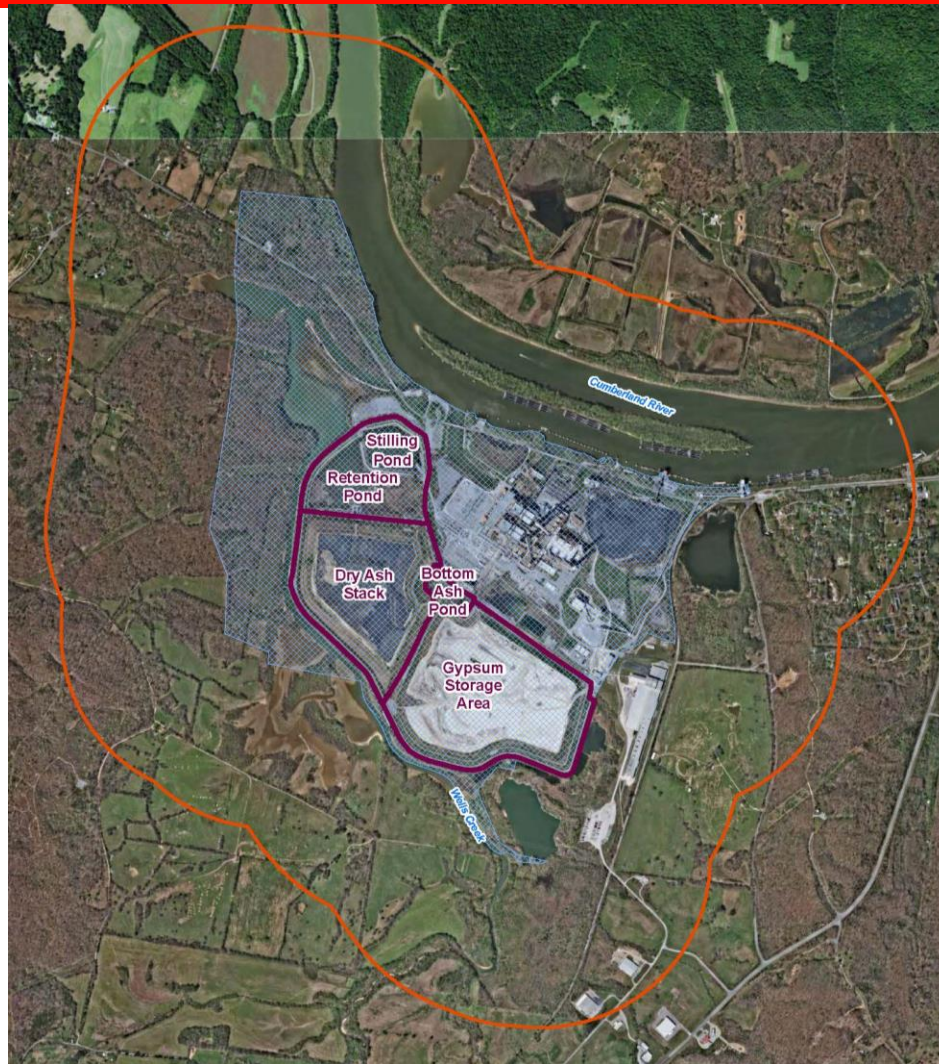
Hydrogeological Investigation SAP



Water Use Survey SAP

- The objective of the Water Use Survey SAP is to establish procedures for identifying and sampling usable water supply wells and surface water sources being used for domestic purposes located within ½ mile of the site
- Samples will be analyzed for CCR parameters

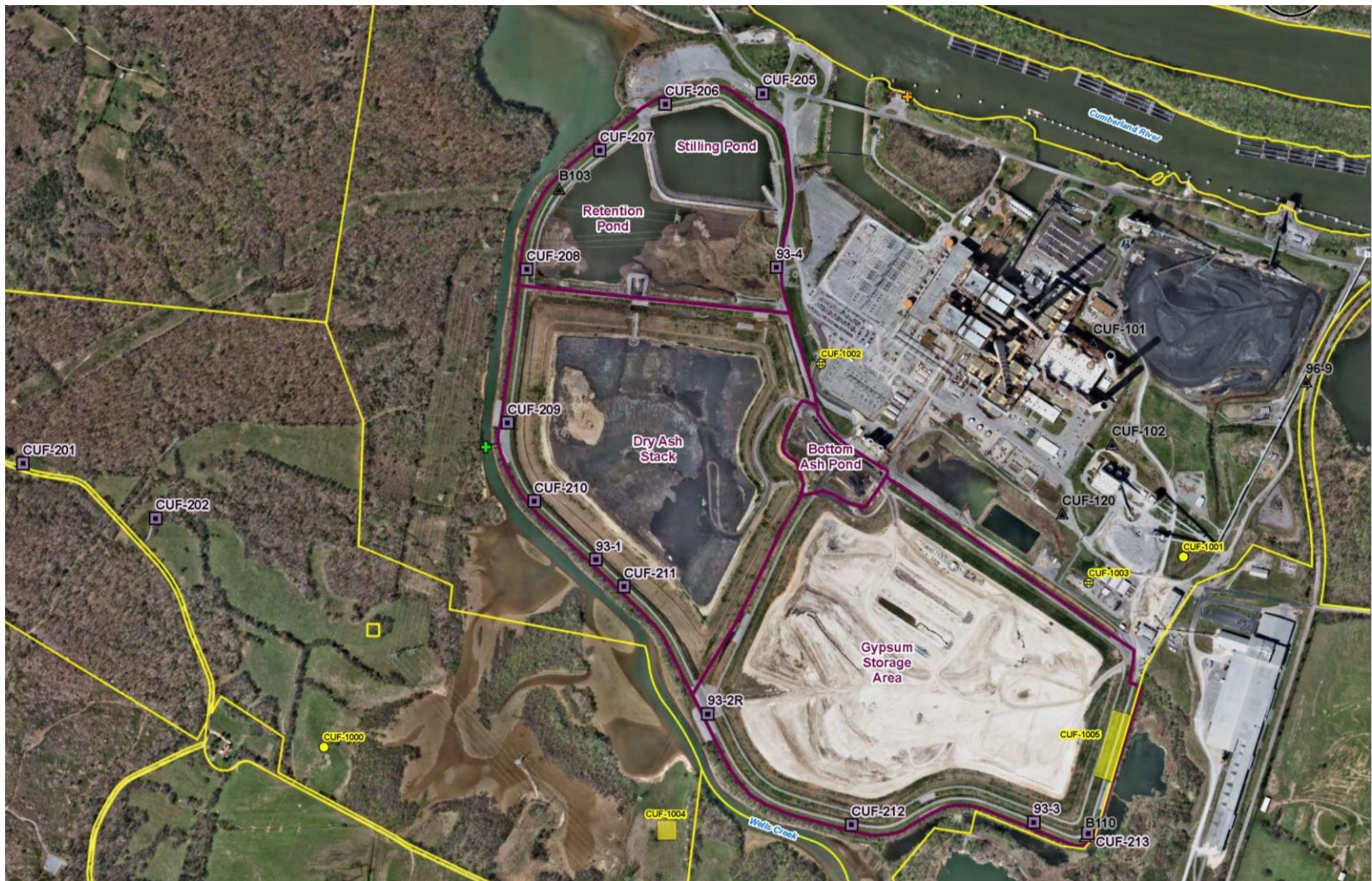
Water Use Survey SAP



Groundwater Investigation SAP

- The objectives of the Groundwater Investigation SAP are
 - to provide the procedures necessary to characterize existing groundwater quality and chemistry
 - evaluate groundwater flow conditions at the facility
 - delineate potential impacts to groundwater

Groundwater Investigation SAP



Benthic SAP

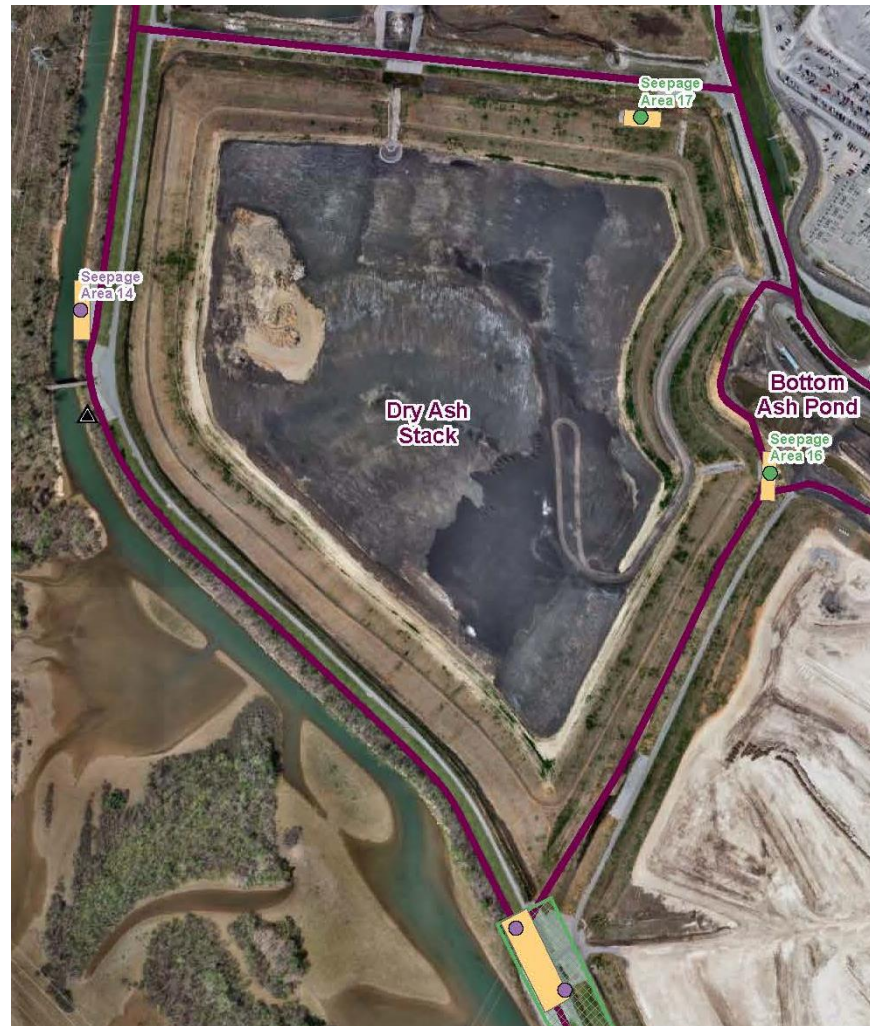
- The objectives are:
 - characterize sediment chemistry
 - determine benthic macroinvertebrate (invertebrate) community composition
 - define benthic invertebrate bioaccumulation
- Samples will be collected from surface streams on or adjacent to the site to determine if CCR material has migrated into those streams
- Delineate potential impacts to sediment and benthic communities on or adjacent to the site
- Samples will be analyzed for CCR parameters



Seep SAP

- The objectives of the Seep SAP are
 - identify and characterize active seeps at the facility for CCR parameters
 - identify information that may explain and/or assess the potential movement of groundwater/pore water with dissolved CCR constituents into surface water streams on or adjacent to the facility, through seepage

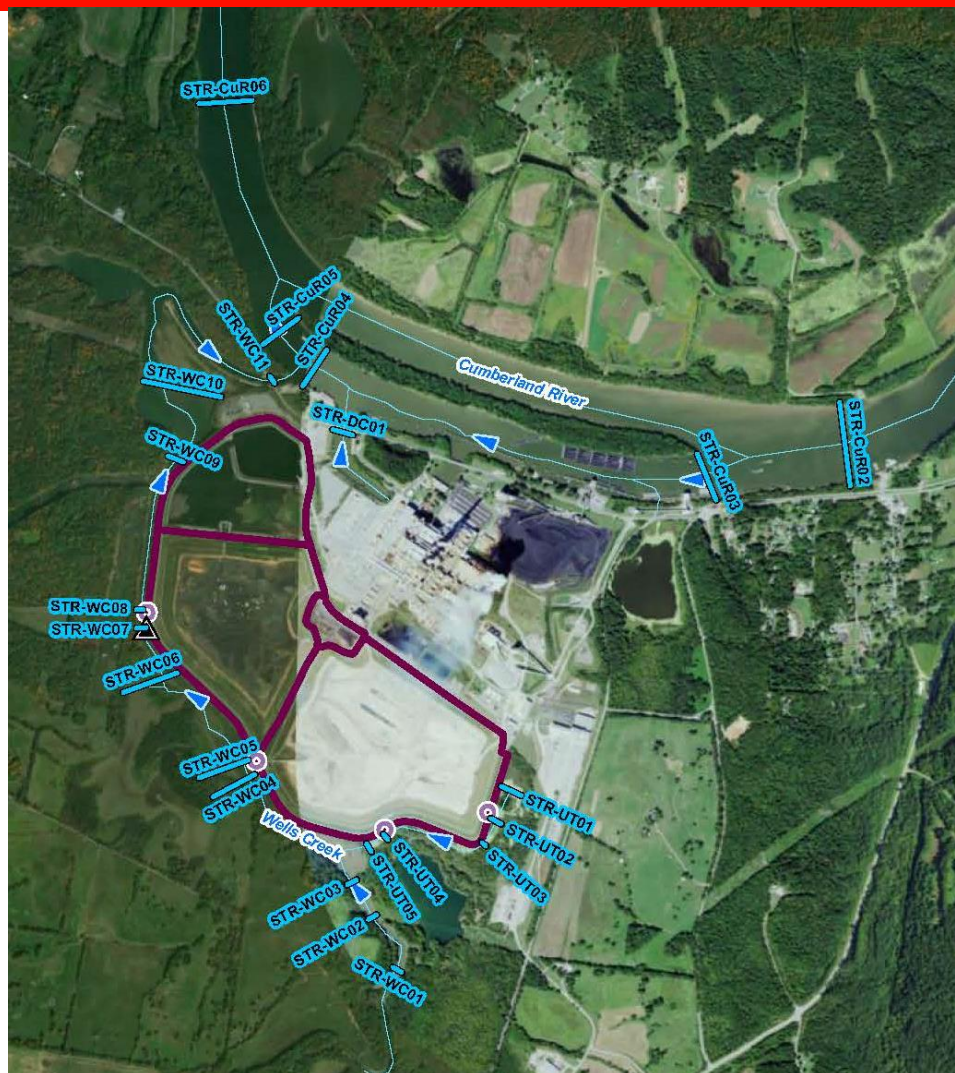
Seep SAP



Surface Stream SAP

- Objectives of the Surface Stream SAP are
 - characterize surface stream water quality on or adjacent to the site for CCR parameters
 - identify information that may explain the potential transport of CCR constituents into those surface streams
 - delineate potential impacts to surface water on or adjacent to the site

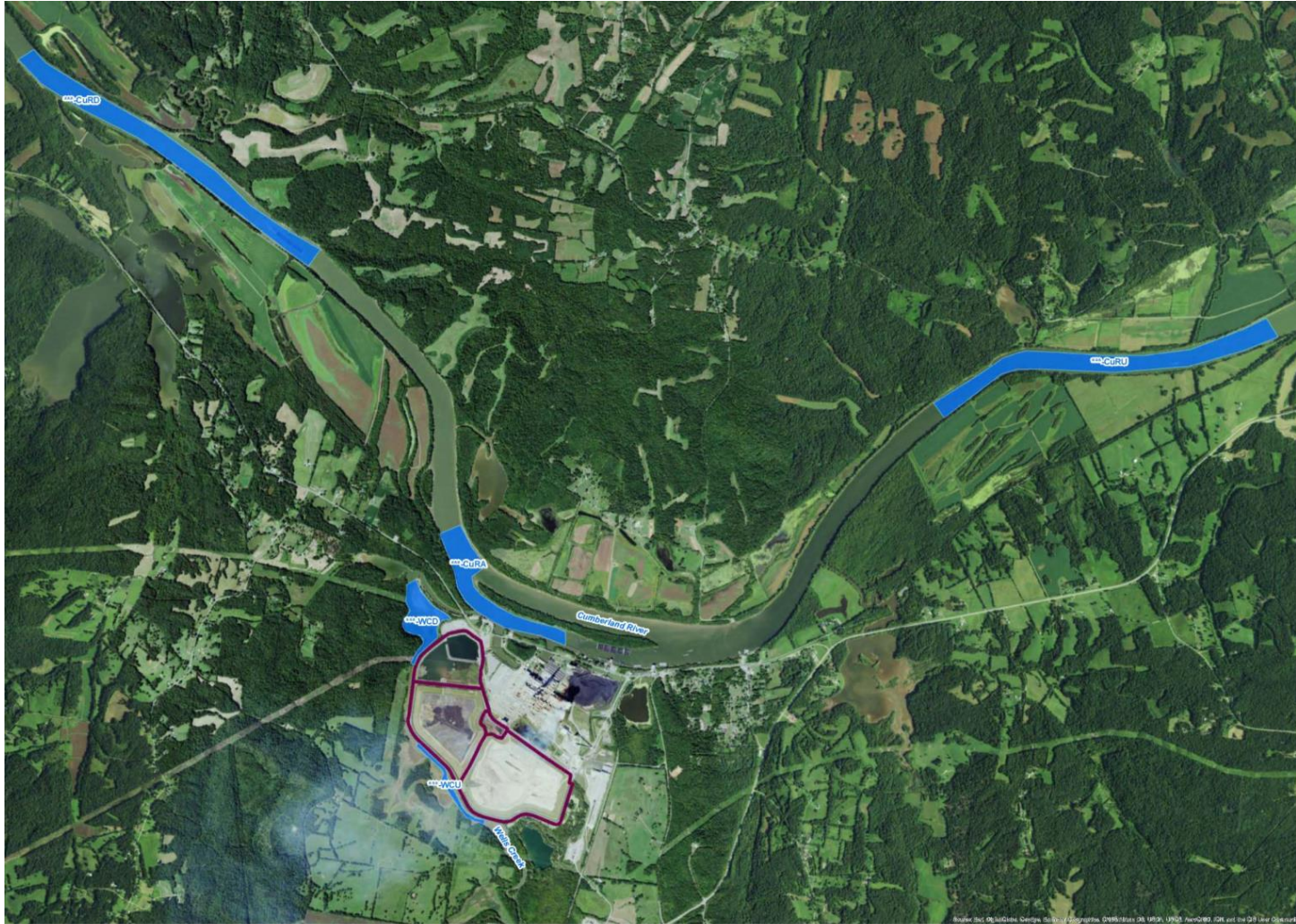
Surface Stream SAP



Fish Tissue SAP

- Objectives of the Fish Tissue SAP are:
 - set forth the procedures to be followed to capture fish, remove tissue samples, and store and ship samples to a laboratory
 - analytical data will be used to assess whether fish in the immediate vicinity and downstream of the facility have higher tissue concentrations of CCR parameters than the same species of fish from reference locations not adjacent to or downstream of the facility

Fish Tissue SAP



Additional Data Included in the EIP

- Regulatory Correspondence
- Figures
- Evaluation of Existing Geotechnical Data
- Historical Monitoring Data
- Public Comments

TVA Commissioner's Order Sites

- TVA Cumberland Fossil Plant (CUF)
 - Active facility and will continue to be
 - Completed and accepted EIP Revision 3
 - AIP meeting was held in March 2018
 - Public comment period is currently open and runs from April 10, 2018 – May 25, 2018
 - Public meeting was held May 3, 2018 in Cumberland City
 - <https://www.tva.com/CumberlandEIP>
 - DSWM currently reviewing new landfill permit documents

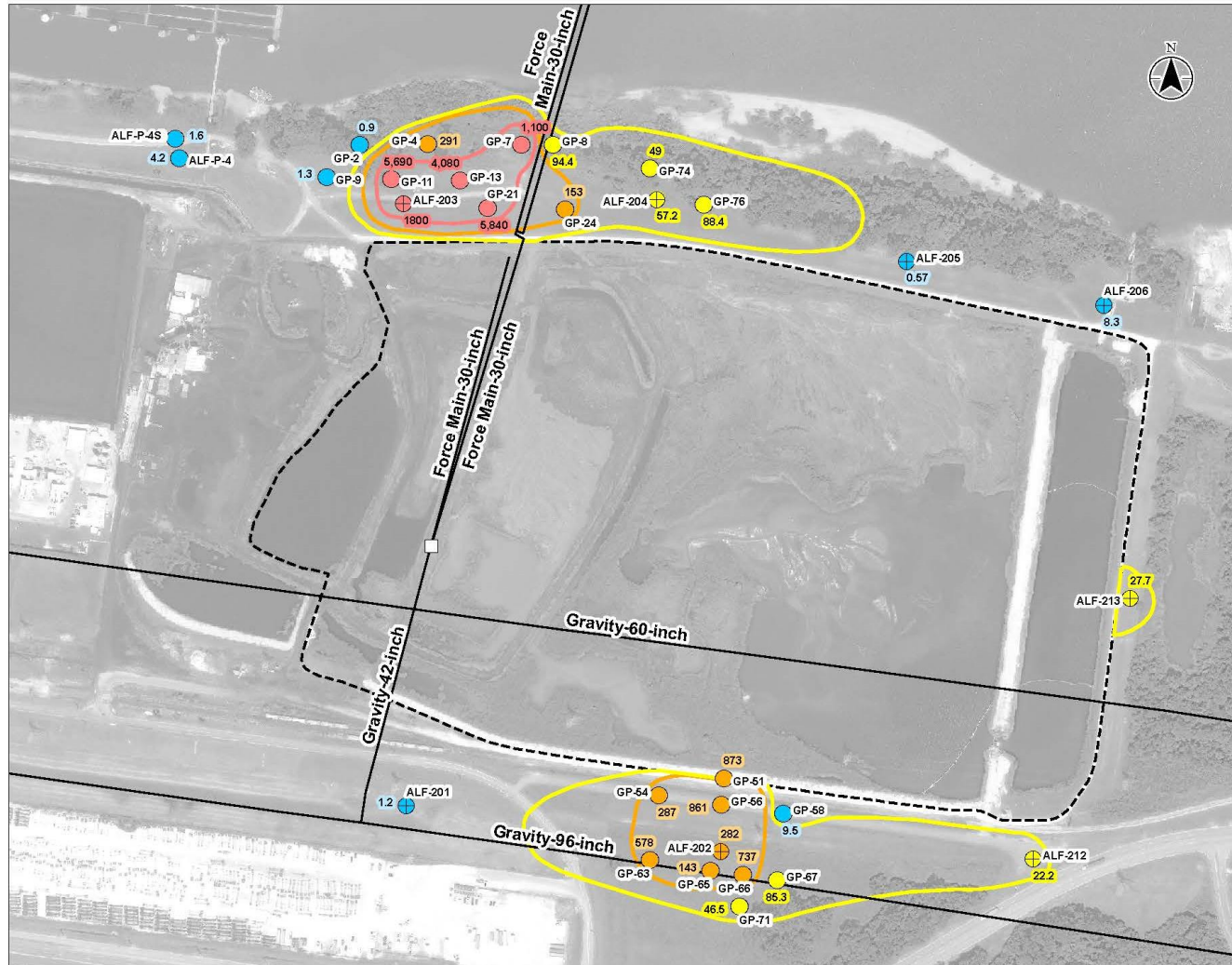
TVA Commissioner's Order Sites

- TVA Allen Fossil Plant (ALF)
 - Facility shut down first week of April 2018
 - TVA currently preparing EIP Revision 2
 - Groundwater investigation has been accelerated under TDEC Division of Remediation (DOR) due to high levels of Arsenic detected at the site, and TVA's plan to utilize the Memphis Sands Aquifer as a cooling water source for the new combined cycle plant

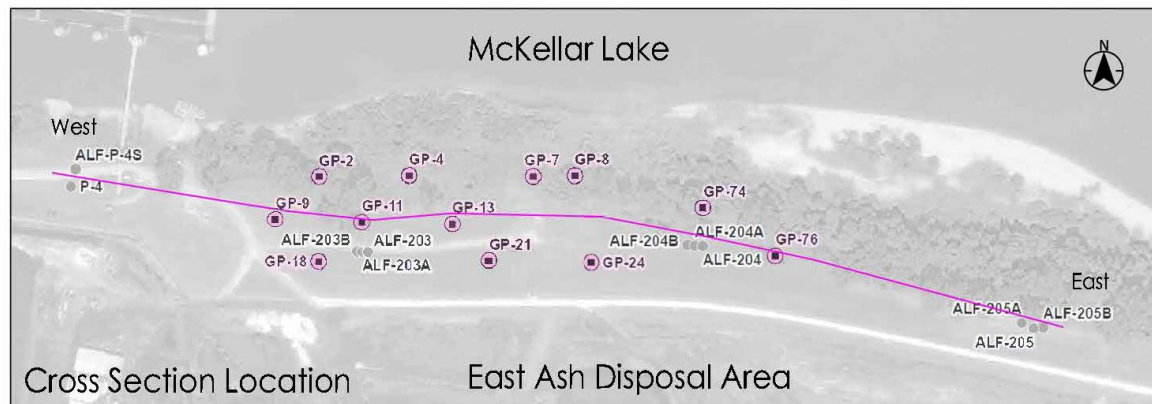
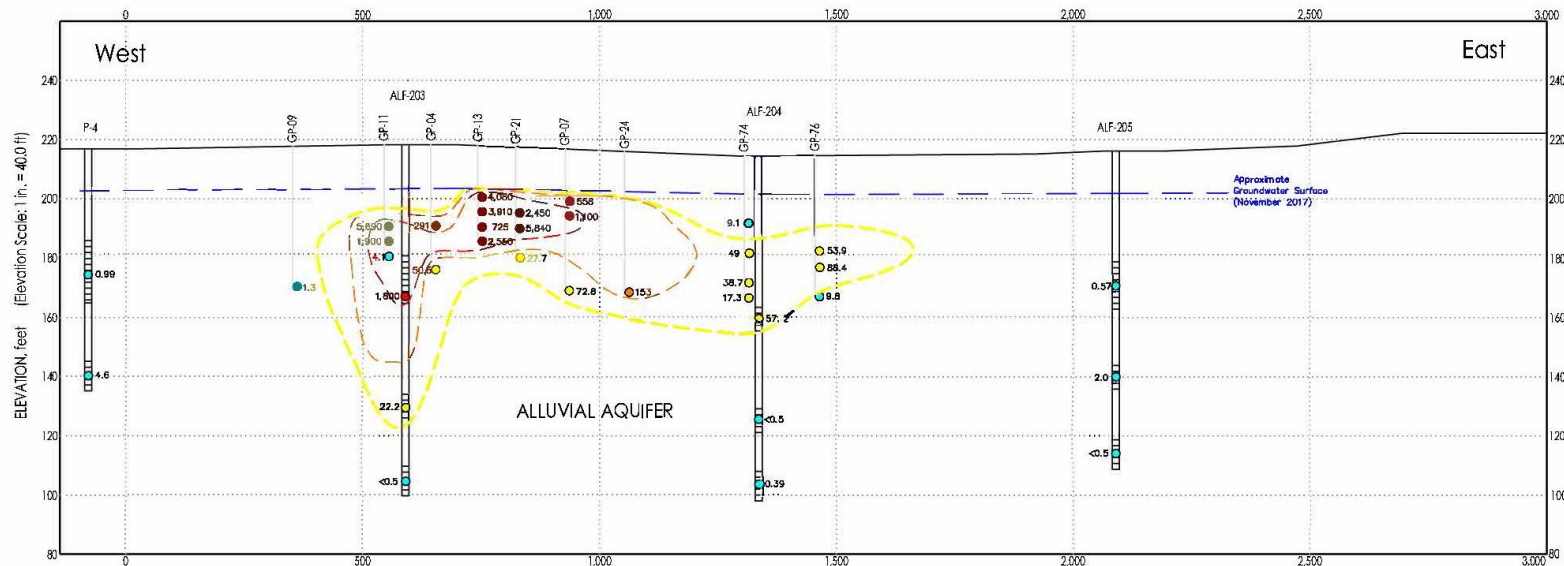
TVA Commissioner's Order Sites

- TVA ALF Remedial Investigation Report submitted March 6, 2018
 - Rough delineation of contaminant plume – needs refinement
 - Contamination appears to be within the middle to upper portions of the Alluvial Aquifer, no impact currently to Memphis Sands
 - Clay confining layer is present but discontinuous with thinning, windows, and faulting
 - Pump test confirmed connectivity between Alluvial Aquifer and Memphis Sands
 - TDEC has reviewed and provided comments on the Remedial Investigation Report
 - TVA is currently working to revise the RI work plan to address data gaps and propose interim remedial measures

TVA Commissioner's Order Sites



TVA Commissioner's Order Sites



DISTANCE, feet (Distance Scale 1 in. = 250.0 ft)

TVA Commissioner's Order Sites

- TVA Johnsonville Fossil Plant (JOF)
 - Closed facility
 - TDEC currently reviewing EIP Revision 2
- TVA Kingston Fossil Plant (KIF)
 - Active facility and will continue to be active
 - TVA currently preparing EIP Revision 3
- TVA Bull Run Fossil Plant (BRF)
 - Active facility and will continue to be active
 - TDEC currently reviewing EIP Revision 2
 - DSWM currently reviewing new landfill permit documents

TVA Commissioner's Order Sites

- TVA John Sevier Plant (JSF)
 - Closed facility
 - TVA currently preparing EIP Revision 2
- TVA Watts Bar Plant (WBF)
 - Closed facility
 - TVA currently preparing EIP Revision 2



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Questions and Comments ?